Nutritional Quality in Formulated Foods[1]

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ABSTRACT

With advances in food technology, fortification of foods for proper nutrition is becoming more complex. Eating patterns are changing; snack foods and formulated products are becoming a larger part of the diet. An added nutrient must be regarded as a food additive and its safety must be established. Meat analogs and meal replacements involve special problems. Additional analytical methods are needed. The optimum quantity of added nutrient must be carefully determined and controlled. Programs must be devised to inform consumers about food quality and safety.

The nutrient content of foods is a basic quality. While the Food, Drug and Cosmetic Act does not speak specifically of "nutritional quality," the obvious concern to provide a safe and wholesome food supply supports the concept that food is the preferred source of nutrients. In the past the majority of food products which made up the American diet were commodities, generally recognized by the consumer and associated with commonly accepted nutritional qualities of food classes.

As foods have become more complex, and fabrication has led to products that cannot be easily put into a traditional food class, the consumer has found it difficult to associate nutritional qualities with some "new" foods. The manufacturer also has had problems: "How can the value of a product be conveyed to the consumer?" "What qualities should be built into a product?"

In the past few years consumer advocates and consumers themselves have expressed concern with the nutritional qualities of new foods. With the development of more sophisticated fabricated products such as meat analogs, which will displace traditional foods from the diet, consumers will expect (and should receive) nutritional qualities equal to or better than those of the foods displaced.

It is easy to say, fortify this food or that food, but the need is to establish basic principles which will control the addition of nutrients to foods. In this way one can have some assurance that the nutritional value of the diet is being maintained, yet can prevent excesses in amounts of added vitamins or label claims.

At the present time the nutrients which would be considered for addition to foods are "generally recognized as safe" or GRAS. They are listed in the Code of Federal Regulations, Title 21, Part 121.101, Section (d)(5). There are some exceptions: folacin is limited to 0.1 ml in a daily dosage, and two amino acids, glycine and methionine, are limited to animal feeds. The actual use of nutrients to fortify or enrich foods is limited in several standardized foods by a regulation establishing a Standard of Identity. However these limitations do not establish any principles, but only serve to control specific nutrient additions.

In establishing principles for adding nutrients to new fabricated foods, there are several basic considerations. One of the first deals with the food itself. For foods which clearly resemble traditional or conventional foods, the nutrient content of the fabricated food could be made to imitate the conventional food. However there may not be comparable foods in the market for many new products. In such cases the proposed function of the product in the diet, for example, breakfast replacement or a main dish, might serve to suggest the nutrient qualities expected to be present in the food.

There may be some instances where neither of the above can be applied. Snack foods are an example. It is not easy to define the role of snacks in the diet, but some type of guidance is needed, both for the industry and for the consumer. The Food and Drug Directorate of Canada has suggested one means for handling the problem of fortification of snacks. In a Trade Information Letter, April 1971, the following guideline was proposed: "Snack foods for which nutritional claims are made and which supply at least 200 cal in a reasonable daily intake, shall contain essential nutrients in proportion to their caloric content."

This concept of balancing nutrients against calories has been suggested by several individuals and groups. The concept needs to be evaluated in relation to actual use patterns. This type of fortification can result in over-promotion of the benefits of "snacks" and confuse consumers. Yet it is clear that the changing eating patterns of young and old, with more "snacks" and fewer traditional sit-down meals, may make "snack foods" more important to the quality of diets.

I will not attempt to present a statement of what the Food and Drug Administration will propose as the guideline for establishing and maintaining the nutrient quality of formulated foods. We are currently reviewing several ideas related to food fortification and nutritional improvement. In addition the Agency has contracted with the National Academy of Sciences–National Research Council to establish a committee to develop nutritional guidelines for a number of food classes. As these guidelines are completed and made public so that consumers and industry can comment, a practical and nutritionally useful set of principles for maintaining the nutritional quality of formulated foods will be developed.

Now let us turn our attention to three basic questions related to the addition of nutrients to foods. Since nutrients or components added to improve the nutrient quality of foods can be considered food additives, a key question is their safety. While most nutrients are safe, several are toxic when consumed at high levels, specifically vitamins A and D. The water-soluble vitamins are generally regarded as nontoxic, but the effect of extremely large intakes on a continuing basis has not been studied for many of these nutrients. Minerals are a somewhat different matter. Iron, recognized as a key essential nutrient, can be toxic if ingested in large quantities. Some persons have suggested that even continued ingestion of five times the iron dietary allowance can be hazardous to some individuals. Other mineral components, particularly the trace minerals such as zinc, copper and manganese, produce toxic effects if consumed in large quantities. These minerals are needed only in very small quantities, yet since fabricated foods are often prepared from purified ingredients, it may be necessary to consider the addition of trace minerals.

The use of amino acids to improve protein quality, especially of cereal and oil seed proteins, will become more important as spun protein and extruded protein products are made available as meat replacements. Amino acids, if added indiscriminately, can be hazardous. The only justification for adding an amino acid to a food is to improve protein quality. The amount of amino acid required for this purpose is generally small, and under most conditions

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causes no problem.

However the addition of an amino acid to a nonprotein food, on the assumption that the food will be consumed at some reasonable level together with a food containing a poor quality protein, could result in the ingestion of considerable quantities of an amino acid. Under such conditions the consumer is in control of the maximum intake of the compound; the only restriction is the quantity of the amino acid-containing food consumed. Such addition of amino acids to nonprotein foods could result in a possible hazard from an imbalance of amino acids. It has been suggested that the addition of amino acids to improve protein quality can be controlled by restricting this addition to foods that are recognized protein sources. In this way the basic restriction of food intake serves to limit the amount of the amino acid. If in addition the amino acid is permitted only in amounts that produce a measurable improvement in protein quality, then there is no danger that excess amino acids will be consumed.

What should be added to foods? It is becoming apparent that with the fabrication of foods from isolated ingredients, nutrient additions will include compounds not even considered when an enriched flour standard was first developed. All of the nutrients considered essential by the Food and Nutrition Board, NAS/NRC, must be reviewed in relation to the nutritive quality of meal replacements. In considering meat analogs, trace minerals and vitamins such as pantothenic acid, for which there is presently no RDA, must be included. The nutrients that the Food and Nutrition Board have called essential currently number 22. If the essential amino acids are included the list is even longer. While few formulated foods would require addition of all nutrients, it is probable that meat analogs or meal replacements based on cereal or oilseed protein might require amino acid addition plus fortification to raise their nutritional quality to acceptable levels. If a greater number of nutrients are to be added, problems of quality control must receive special consideration.

Unfortunately the development of procedures for the analysis of the nutrient content of formulated foods has been almost nonexistent in recent years. The regulation of new formulated foods may be more difficult than when only one or two nutrients were added within fixed limits. With the increased number of added nutrients, particularly to foods composed of ingredients for which only limited analytical data are accessible, the availability of these added nutrients must be determined. Nutritionally improved products are those which provide the consumer with nutritional benefits when the product is ingested. The simple addition of nutrients is not evidence that the food is nutritionally improved. This is a particular problem in relation to amino acids. Processing effects may bind the added amino acid so that, although the product contains the amino acid added, its nutritional quality has not been improved. Problems of availability may also develop when trace minerals are added. Tests for biological availability need to be developed and evaluated for some types of these new formulated products which contain added nutrients and amino acids.

A final question that must be considered in relation to the improvement of nutritional quality of formulated food is, "How much should be added?" The purpose of any nutrient addition should be to make it easier for the consumer to purchase and consume an optimal diet. This does not mean every food should be made complete in relation to all or most vitamins and minerals. The potential hazards indicated in relation to vitamins A and D, and the confusion that results in the consumer's mind when small amounts of foods are claimed to be "complete," make it essential that control be exercised. For many formulated products the addition of nutrients, when permitted, will serve to assure that the consumer receives the nutrients expected from the food when used in a specific manner in the diet. Random addition of nutrients to foods is not good nutrition, nor does it result in optimal diets.

The use of nutrient additions to formulated foods is a special use of a special class of food additives. Regulation and control, to assure that consumer benefit is provided, are as necessary as when other types of additives are used in foods.

One final consideration should be mentioned. Consumers are becoming increasingly interested in what is present in the food supply. How to inform the consumer of ingredients, nutritional quality and safety have become major programs in government and industry. Nutritional qualities cannot be seen. Appearance and flavor, along with the other characteristics of food, will be the factors that cause the consumer to add a new formulated food to his diet, perhaps displacing a more familiar traditional food. The nutritional qualities of the new formulated products must be carefully designed to meet the nutritional need in the diet which results from the success of the new food.

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